Amendments to the Specification

Please replace paragraph **[035]** with the following amended paragraph:

[035] The feed assembly may include a horn array that may be fed with a multi-band OMT/polarizer assembly with a six-port network behind each horn to provide dual-circular polarization capability at each frequency band, for example, the K, Ka, and EHF bands used to illustrate one embodiment. A novel, compact OMT/polarizer assembly that may be suitable for multi-beam applications and may generate dual-circular polarization capability at each band and for each beam is disclosed in a co-pending U.S. patent application, Application No. 10/714,421, filed November 14, 2003, titled "A Compact Tri-Band OMT/Polarizer Suitable for Multi-Beam Antennas", and incorporated herein by reference.

Please replace paragraph **[037]** with the following amended paragraph:

[037] Figure 2 shows the reflector geometry of the multi-band and multi-beam antenna system 100. Antenna system 100 may employ an offset reflector antenna having a modified-paraboloid shaped reflector 102 with a diameter 112, a focal length 114, and an offset 106. Modified-paraboloid shaped reflector 102 may have, for example, an 85.0 inch diameter 112, a 104.0 inch focal length 114, and a 19.0 inch offset 106. Offset 106 may provide an offset clearance to avoid geometrical blockage from the feed array 104. The aperture size, i.e., diameter 112, of the reflector 102 may be designed using an analysis reported by Rao in IEEE Antennas and Propagation Magazine, referenced above. The aperture size, D, of the reflector may take into account the effect of small beam broadening at K-band caused by reflector shaping at higher bands (EHF- and Ka-bands) by adjusting the value of a constant used in an equation for an unshaped paraboloid reflector from 65 to 70 and may be given as:

$$D = 70 \times (\text{wavelength (at 20.2 GHz)}) / (\text{half-power beam-width}) \quad (1)$$

where the half-power beam-width may be defined as the diameter of the beam when the power drops –3 dB relative to beam peak power and is also referred to as the "3 dB beam-width". The antenna system 100 may be designed, for example, to generate a congruent set of 19 beams 116 of 0.5 degree in size, i.e. beam diameter 117, as shown in Figure 3. The 19 beams 116 may overlap each other in order to produce a contiguous coverage over a theater region 118 of 1.8 degrees. The congruent set of beams 116 at the three bands may be arranged in a hexagonal grid layout with an inter-beam spacing 120 of 0.433 degrees as shown in Figure 3.

Please replace paragraph **[038]** with the following amended paragraph:

[038] Based on the beam spacing 120 and the offset reflector geometry as shown in Figure 2, the maximum feed size 121 (see Figure 4) may be obtained as 0.892 inch (see Rao, IEEE Antennas and Propagation Magazine, referenced above) and a horn internal, or aperture, diameter 122 of 0.88 inch, for example, may be used, as seen at Figures 4 and 5. The 85.0 inch reflector 102 may be oversized at EHF-band and may produce a beam diameter 117 of only 0.2 degrees assuming an unmodified parabolic shape of the reflector 102. The beam broadening at EHF and Ka bands may be achieved using the following steps of a design methodology:

(A) The surface of the reflector 102 may be moderately shaped, i.e., modified, such that the EHF-band and Ka-band beams broaden up to 0.4 degrees. Increased shaping to broaden fully to 0.5 degrees may result in decreased gain performance at K-band (20 GHz).

(B) The feed array 104 may be defocused by 0.25 inch at EHF-band and by 0.1 inch at Ka-band in order to broaden the EHF and Ka beams 116 from 0.4 degrees to 0.5 degrees while keeping feed array 104 focused for K-band beams, i.e., the phase center of the feed horns 124 (see

Figure 4) at K-band lies along the nominal focal-surface of the reflector 102. Increased defocusing at EHF may result in large ellipticity of the beams 116 which may reduce the directivity performance as well as sidelobe isolation of the beams 116 that is necessary for reusing the frequencies and, thus, should be avoided.

(C) A high-efficiency multi-mode circular horn 124 (see Figure 5) with 90% efficiency (compared to conventional 75% efficiency) may be designed with "frequency-dependent" characteristics to achieve 0.25 inch phase center separation between K-band and EHF-band frequencies. The phase center 126 at EHF-band may be 0.25 inch inside the horn 124 relative to the aperture center 128 (phase center at K-band may be designed to be at the aperture center 128).

(D) The feed horns 124 may be placed on a spherical cap <u>125</u> with a radius of 114.0 inch (distance from the aperture center 130 of the reflector 102 to the focal plane 105 (see Figure 2)) and centered at the aperture center 130 in order to minimize scan distortion effects on the outer beams - such as beams 116 numbered 4, 17, 10, 9, 11, 18, 85, 19, 8, 6, 7, and 16 in Figure 3.

Please replace paragraph **[039]** with the following amended paragraph:

[039] A compact 6-port OMT/polarizer 132 (see Figure 4) may be required such that each tri-band OMT/polarizer 132 fits within the available real estate, for example, of a 0.892 inch diameter circle, determined by the maximum feed size 121. The development of this novel OMT/polarizer 132 is disclosed in the U.S. patent application referenced above and incorporated herein by reference. Figure 4 shows the physical layout of the feed array 104 assembly that may include, for example, 19 multi-mode horns 124 and 19 tri-band OMT/polarizers 132 with dual-circular polarization capability at each band. <u>Each of the horns 124 of the feed array 104 may be connected to a distinct OMT/polarizer from</u>

the plurality of OMT/polarizers 132. For example, the particular horn 124' may be connected to and fed by the distinct OMT/polarizer 132', as shown in Figure 4. The feed array 104 assembly may also include waveguides 134 and flanges 136, as known in the art.